Introduction

Hysteroscopy is a procedure that may appear to be minimally invasive but may result in potentially disastrous complications. A patient's outcome can be dramatically affected by the vigilance and communication of the entire operating room team. Hysteroscopy requires the insertion of a hysteroscope into the uterine cavity and the use of a suitable distention medium for visualization of the endometrium[1]. Many variations of media exist although none meet the criteria for the ideal medium one that is isotonic, electrically inert, nontoxic, transparent, inexpensive and easy to sterilize[2]. The most commonly used solutions for hysteroscopies are 1.5% glycine and sorbitol. These solutions are moderately hypotonic in an effort to preserve their transparency and enhance the visual field for the surgeons[2]. Hypotonic electrolyte free distention media has the potential to be absorbed in volumes large enough to cause hyponatermia and hypervolemia, a complication initially described as TURP syndrome. If unrecognized this condition can progress to hypotension, pulmonary edema, and cerebral edema and can often be fatal[3].

Case Summary

A 40 yr old female ASA II presented with a history of menorrhagia. The past medical history was positive for smoking. Patient was not on any prescribed or over the counter medications. Preoperative labs consisted of CBC and were within normal limits. The EKG revealed sinus Tachycardia with no axis deviation. The patient's surgical history revealed two previous hysteroscopies for myoma resections. The resection prior was discontinued due to extensive bleeding which inhibited visualization of the surgical field. Pre-operative medications were administered in the preoperative holding area and consisted of 2mg of Versed intravenously, and 1Gm of Ancef intravenously.

Upon arrival to the operating room standard monitors were placed and induction was performed with Propofol, Lidocaine, Remifentanyl and Rocuronium. The induction was smooth and the patient was started on a Propofol infusion titrated from 125mcq/kg/min to 150mcq/kg/min and Remifentanyl infusion titrated from 0.5mcq to 0.7mcq/kg/min for the remainder of the surgical procedure. The patient remained hemodynamically stable throughout the anesthetic.

Glycine 1.5% was media used to facilitate the procedure. Approximately an hour and half into the procedure the circulating nurse informed the surgeon that the fluid volume deficit was 2400cc. The patient remained hemodynamically stable. An Istat was performed and revealed, Na^+ 122 mEq/L, Glu 81 mg/dL, K^+ 3.6 mEq/L and ionized Ca^+1.1 mg/dL. The surgeon was notified of the hyponatermia and procedure was terminated. A total of 10mg lasix intravenously was given and a foley was inserted. Patient responded appropriately to verbal stimuli and was extubated without difficulty. Patient remained stable, in the PACU urine output in the first 15 minutes was 800cc and 800cc bolus of LR was given for replacement. In the PACU a twelve-lead EKG remained unchanged and Istat showed a Na^+ 129 mEq/L. Serum Osmolarity was not drawn. The recovery was uneventful and the patient was discharged to home later that evening.

Discussion

Resecting the myoma through the hysteroscope prevents the need for a laparotomy, uterine incision and need for postoperative hospital stay[4]. While it offers some advantages for the patient it is not without some risk. Distention of the uterine cavity requires inflow pressures of 80-100mmHg[1]. Excessive absorption of irrigating media occurs when open channels are exposed to high inflow pressures[5]. The desirable properties that make the amino acid glycine

suitable media for surgical hysteroscopes are the same that can cause excessive systemic absorption of the media resulting in hyponatermia, hypokalemia, hypocalcemia and hyposomolarity . This mechanism is associated with TURP syndrome[1].

Complications related to absorption of fluid are dependent upon the amount and type of fluid absorbed. There are some basic principles that determine the amount of fluid absorbed (1) the height of the container determines the hydrostatic driving pressure of the fluid, and (2) time of the procedure in relation to the amount absorbed, as much as ten to thirty milliliters of fluid is absorbed for every minute of resection of the myoma[2]. Keeping uterine pressure below mean arterial pressure can minimize absorption[6]. Fluid placed 36-52 inches above patient can generate a pressure between 70-100mmHg. Prevention of excessive absorption can be accomplished by precise measurement of fluid infused and fluid recovered[2]. Surgical team members calculate fluid deficits by measuring amount of media instilled into the uterus minus amount returned in collection containers [6]. General rule, for every liter of hypotonic fluid absorbed the serum sodium will decrease by 10mmol/L[7,8]. It is recommended that the case be terminated when fluid deficit is between 1000 to 2000ml[8].

Intracellular absorption and metabolism of Glycine leads to excessive extracellular free water and results in hypo-osmolar hyponatermia if not eliminated. The additional secretion of ADH as result of the stress response to surgery reduces the elimination of excessive water thus worsening the situation. Clinically what is seen as water moves along osmotic and hydrostatic gradients extravascularly is hypertension and bradycardia with subsequent pulmonary edema and hypotension[1,2]. Water may also move across the blood brain barrier and result in cerebral edema with increased intracranial pressure. A major metabolite of glycine ammonia can also contribute to CNS symptoms associated with excessive absorption[1,8].

A high index of clinical suspicion associated with long resection or documented significant fluid deficit can lead to early recognition and treatment. There is some controversy in the treatment modalities in reducing the fluid overload and correction of serum sodium. In symptomatic patients the recommendations are to replace sodium and eliminate excessive water. If both osmolarity and serum sodium are low than hypertonic saline can be infused, however excessive speed of correction can cause central pontine demyelination[1,2]. Some patients may be asymptomatic despite low serum sodium levels. It is recommended that hypertonic saline be avoided in these instances because of its association with central pontine demyelination. Close observation and supportive care are appropriate in mild cases. Fluid restriction, saline replacement and diuresis can also be used[1].

Most of the complications associated with hysteroscopies are avoidable and rare. In the case described above, the excessive absorption of irrigating solution may have been related to the resection time which was an hour and thirty-five minutes, as neither height of solution or excessive intrauterine pressure where noted. Note, this was a large myoma that had been resected in part three months prior. Absorption of fluid is proportional to the time of resection[2]. Operative hysteroscopies that last for more than one hour and require large amounts of tissue resection are more likely to lead to fluid volume overload [3]. Vigilance and continuous communication among the surgeons, anesthesia providers and nursing staff assist in the early recognition and rapid treatment of this complication and are vital for a successful patient outcome.

1. Murdoch, JA, Tong, JG. Anesthesia for Hysteroscopy. Anesthesiol Clin North Am 2001; 19:125-40.

2. Malhotra, V. Transurethral resection of the prostate. Anesthesiol Clin North Am 2000; 18:883-97.

3. Cooper, JM, Brady, RM. Intraoperative and early postoperative complications of operative stereoscopy. Obstet Gynecol Clin North Am 2000; 27:347-66.

4. Schenk, LM, Coddington, CC. Laparoscopy and hysteroscopy. Obstet Gynecol Clin North Am 1999; 26:1-22.

5. Scott, SM. Pulmonary edema and hyponatermia during hysteroscopic resection of uterine fibroids: case report. CRNA 1998; 9:113-17.

6. Morrison, DM. Management of hysteroscopic surgery complications. AORN 1999; 69:194-215.

7. Prost, AM, Liberman, RF, Harlow, BL, Ginsburg, ES. Obstet Gynecol 2000; 96:517-20.

8. Isaacson, KB. Complications of Hysteroscopy. Obstet Gynecol Clin North Am 1999; 26:39-51.

Hypo-osmolar, hyponatermia following hysteroscopy

Colleen M. Estes, LCDR, NC, USN, SRNA[1] John P. Maye, LCDR, NC, USN, CRNA, Ph.D.[2]

Telephone (619) 532-8966 – John Maye, LCDR, NC, USN, CRNA, Ph.D.

[1]Naval School Health Sciences, San Diego Ca – Student Nurse Anesthetist

[2]Naval School Health Sciences, San Diego Ca – Clinical Research Coordinator

For revisions, contact Colleen Estes, LCDR, NC, USN, SRNA at (619) 532-8966